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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,679	07/14/2003	Wen-Chueh Pan	PANW3002/EM	4127

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EXAMINER

SHAKERI, HADI

ART UNIT	PAPER NUMBER
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3723

DATE MAILED: 01/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application N . 10/617,679	Applicant(s) PAN ET AL.	
	Examiner Hadi Shakeri	Art Unit 3723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 4-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Regarding claims 4, and 6-8, the language as written renders the claims indefinite. The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors. It is unclear what is being claimed by, e.g., "...abrasion is worked by applying cavitation generated by scanning..."; "...abrasion is worked by applying the ultrasonic waves to a pad to enable said pad to drive...". It also noted that it appears that no further steps are recited only what would naturally follow the step of applying ultrasonic "abrasion" or wave. Further it is also noted that "said ultrasonic abrasion" is confusing, i.e., is it step (c), step (d) or both?

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

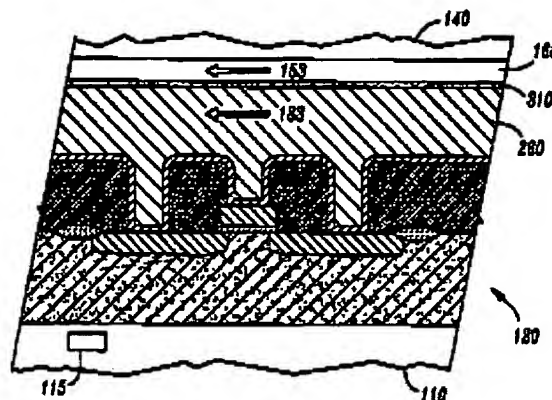
A person shall be entitled to a patent unless —

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-8 as best understood are rejected under 35 U.S.C. 102(b) as being anticipated by Maury et al. (6,051,500).

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Maury et al. discloses all of the limitations of claim 1, i.e., a method of polishing metal and barrier layer interconnect integrated with an extremely low dielectric constant material, said method comprising the steps of: (a) preparing a wafer composed of a copper layer (260) and the extremely low dielectric constant material (220), said copper layer being positioned over the low dielectric constant material, a barrier layer (250) being positioned between said copper layer and said low dielectric constant material; (b) treating said copper layer chemically (i.e., oxidizing the conductive material, col. 5, line 58) to produce a hard and brittle surface residue layer on the surface of said copper layer; (c) applying ultrasonic abrasion (i.e., producing ultrasonic vibration by polishing the first layer) to said surface residue layer to cause the brittle fracturing of said surface residue layer, thereby rendering effective polishing of said wafer; (d) applying the ultrasonic abrasion to said barrier layer (i.e., producing ultrasonic vibration by polishing the second layer) to render effective polishing of said wafer.



Regarding claims 2-8 (as best understood), Maury et al. meets the limitations, e.g., cuprous oxide; pad (160); transversal waves.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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7. Claims 1-8 as best understood are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Symersky (3,822,467) in view of Sato (5,688,364).

Symersky discloses all of the limitations of claim 1, e.g., a removal method of a metal and barrier layer with the use of ultrasonic vibration, col. 8, line 35, however, in the alternative, Sato is cited.

Sato teaches the use of ultrasonic vibration to CMP polishing of different layers of semiconductor devices. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the invention of Symersky with ultrasonic abrasion for all layers as taught by Sato to enhance the polishing rate (Sato col. 6, line 25).

Regarding claims 2-8 as best understood, Symersky in view of Sato meets the limitations, metal oxide (skin or oxidation removal in CMP); different types of waves (Sato col. 8, line 20).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

R sponse to Arguments

9. Applicant's arguments filed 11/22/04 have been fully considered but they are not persuasive.

The argument that Maury et al. does not meet all of the limitations of claims 1-8, is not persuasive. First regarding step (b) treating the copper layer to... Maury et al. clearly indicates in col. 5, lines 57-59, that "...oxidizing component of the slurry 310 oxidizes the conductive material 260..." meeting the limitations as recited. Regarding steps (c) and (d), "applying ultrasonic abrasion to said..." lacking proper steps or other limitations to define the "ultrasonic abrasion", the CMP process by Maury that produces ultrasonic waves, whether it is used for endpoint detection or other reasons, is considered to meet the broad limitation of "applying ultrasonic abrasion". Further regarding claims 4-8, the scope of claims as indicated were and still are unascertainable, as best understood, the "ultrasonic abrasion" is defined as applying ultrasonic waves to the pad. The CMP process of Maury that produces ultrasonic waves, which naturally would also be applied to the pad, meets this feature. The functional/narrative language in these claims in view of 112, 2nd rejections, does not positively add a sub-step not met by Maury et al.

It is further noted that although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993), therefore

10. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the

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knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In this case, Sato et al. specifically teaches improving polishing rates by applying ultrasonic wave vibration to a processing substrate (Abstract). Symersky discloses removing excessive conductive layer, although, etching is the preferred method as disclosed by Symersky, removing the excess layer by CMP in combination with application of ultrasonic vibration in view of Sato et al., would be within the knowledge of one of ordinary skill in the art. It is further noted, that the claimed invention as recited, is not in any way directed or limited to CMP processes. "A method of polishing..." as recited in the preamble of claim 1, lacking any steps to define the "polishing", except for "applying ultrasonic abrasion", does not render the references as nonanalogous, since both the base reference and the teaching reference are concern with a method of removal of excessive parts. The base reference, Symersky, discloses that in the step of removing the excess material, ultrasonic vibration may be used, col. 8, lines 35-36. Sato et al. is utilizes which specifically teaches the benefits of using ultrasonic vibration.

It is noted that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

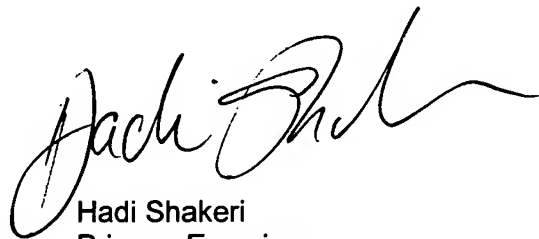
With regards to the argument against Sato, even though, Sato is not applied to the claims individually, at this time, it is noted however, that Sato et al. is not directed to a general CMP, rather specifically to dielectric material, as in col. 8, and that steps (b) and (c) are disclosed, e.g., silicon oxide system, col. 2, which would inherently meet the steps by subjecting the oxide layer to the vibration.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hadi Shakeri whose telephone number is (571) 272-4495. The examiner can normally be reached on Monday-Friday.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Hadi Shakeri', with a stylized flourish at the end.

Hadi Shakeri
Primary Examiner
Art Unit 3723
January 24, 2005